

Deeper Research Directions

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Basic Design-Space Points for Rules

- FOL -- ISO Common Logic
- LP -- RuleML
- OWL + Horn -- SWRL
- Pick your favorite for your application!
 - But some are Webized better

More Research Challenges: Core

- Integrating rules with ontologies
 - Rules refer to ontologies (e.g., in RuleML)
 - Rules to specify ontologies (e.g., Description Logic Programs)
 - Rules to map between ontologies (e.g., ECOIN)
 - Combined rules + ontologies knowledge bases (e.g., RuleML + OWL)
- Describing business processes & web services via rules + ontologies
 - Rules query web services (e.g., in RuleML Situated feature)
 - Rules trigger actions that are web services (e.g., ditto)
 - Capture object-oriented process ontologies
 - Default inheritance via rules (e.g., Courteous Inheritance)
 - Wrapper/transform to legacy C++, Java, UML
 - Develop open source knowledge bases (e.g., MIT Open Process Handbook Initiative)
 - Event triggering of rules (e.g., capture ECA rules in RuleML)
 - Rules in process models, e.g., cf. OWL-S, PSL

More Research Challenges: Business Policies

- Apply advanced rule and ontology representation to business policies in compliance, trust, contracts, etc.
 - Application scenarios for compliance checking/support services intra- and inter- enterprise
 - Policy language & engines on top of rule language & engines
 - In/with existing/emerging standards: XBRL, XACML, P3P, ebXML, EDI, Legal XML, ...
 - Strategy and roles in the market ecology: regulators, communal repositories, service providers, etc.
 - Embedding into the bigger pictures of financial services, e-commerce, semantic web services, business process automation

Some Interesting Directions for DAML Rules

(- but most of it beyond Program End)

- *Preamble: ...*
- *These directions are for both RuleML and SWRL.*
- *CAUTION: Most of these directions have time horizon beyond the end of the DAML Program.*

Some Interesting Directions for DAML Rules

- some of it nearer term

- Alternative syntaxes
 - Presentation Syntax for human authoring
 - Draw upon ideas in Prolog, N3, HiLog/F-Logic, XQuery, RDF-Query
 - RDF syntax for RuleML
- Extend SWRL and RuleML towards FOL
 - Focus: define syntax
 - Coordinate with Simple Common Logic, DRS
- Application scenarios, use cases
 - E.g., Services SCAMP
 - E.g., ontology translation / data mappings

Some Interesting Directions for DAML Rules

- some of it nearer-term

- Inferencing techniques, with associated theory and complexity
- Translation mappings and techniques b/ rule systems
 - More rule systems/languages, esp. of types important commercially
 - \leftrightarrow Ontology systems too
- More implementation experience, generally
- Refine application \Rightarrow technical requirements/focus, generally
 - where's the business/social value

Some Interesting Directions, cont.'d

- Combine SWRL with Nonmon
 - A requirement from SWSI Rules
 - Negation-As-Failure, Priorities; Aggregations (require closing)
 - It's already available in RuleML
 - So one obvious approach is to translate SWRL to RuleML
 - ... using DLP OWL2RuleML translator (e.g., SweetOnto)
- Extend SWRL to OWL-Full
 - How much immediate demand is there for this?
 - Can use HiLog techniques (e.g., in Flora-2)

Some Interesting Directions for DAML Rules

- More expressiveness in direction of existentials (head/outer).
 - E.g., simpler semantics/theory for anonymous existentials, bnodes, and their relationship to skolemization (cf. recent Yang & Kifer work)
- More about attached procedures cf. Situated LP and Jess/production rules, and some policy languages:
 - Dynamic sensing, e.g, query a web service
 - Actions/effectors with side effects
 - Develop use cases to start, e.g., in SCAMP
- Justifications, proofs, explanations – interchangeably
 - E.g., use and extend InferenceWeb
- Extension toward HiLog limited higher-order expressiveness (esp. LP)
- Extension toward Lloyd-Topor style syntactic sugar (esp. LP)
- Extension towards F-Logic extension, esp. in presentation syntax